LEAST COST HOUSING:
THE POTENTIAL FOR ENERGY EFFICIENCY IN NEW CONSTRUCTION

by

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The Potential For Energy Efficiency In New Construction

ABSTRACT

Newly constructed residential buildings must often comply with a maze of codes and regulations. Almost all building codes specify a minimum thermal efficiency that a structure must attain. Yet the standards that buildings constructed in Rhode Island must meet provide inadequate energy efficiency. Thicker walls, more roof insulation and tighter houses could reduce energy loss substantially. And while these additional features add to the initial cost of a home, they can pay for themselves in terms of energy savings rather quickly.

For example, a model house built to the minimum criteria established by the state building code would cost a little over $800 a year to heat. This structure would cost more than $17,000 to heat over an estimated lifetime of fifty years (to calculate heating costs, future savings are discounted using a 10% interest rate and a 6% annual fuel price increase). Given an initial cost of $85,000, the total lifetime cost of this "code minimum" structure would be $102,000. In comparison, a structure with thicker insulation (2x6 walls instead of 2x4's) double pane windows, an energy-efficient furnace and a tighter "shell" would only cost $200 a year to heat. While the up-front cost would increase by $2,700, the total lifetime cost of the structure over fifty years would be only $92,000. This represents a present-worth savings of over $10,000.

Evidence of such savings have been documented in a model house built in Providence in 1987. For a two-unit duplex, each with 864 ft^2 of floor area, winter heating bills averaged approximately $150 a unit. Significant to this case is the fact the homeowners are lower-middle income; their reduced energy costs will free up a portion of their income for expenditure on other important goods and services.

To improve a building's overall energy-efficiency, other uses of energy must also be minimized. Savings in hot water and electricity from low-flow showerheads, fluorescent light bulbs and efficient refrigerators can also substantially reduce a home's energy costs.

Thus an "optimal case" model is established that substantially reduces the total energy use of a structure. This model is then compared to the criteria being used for a public housing project in Providence, R.I. The program calls for 240 units of scattered public housing to be built throughout the city. By analyzing the two cases it is determined that by adopting the improved energy criteria for the last 109 units only, a total savings of $830,000 can be expected over a fifty year expected lifetime for the project. As far as purely an economic investment of money, a rate of return on the investment is determined to be 18.3%. It also translates into an additional six units of public housing that could be built sometime in the future. And finally from an environmental perspective, the project's energy savings over fifty years would be the equivalent of conserving over 73,000 barrels of oil.

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